



## On the species of *Tuoba* (Chilopoda: Geophilomorpha) in Australia, New Zealand, New Caledonia, Solomon Islands and New Britain

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**Abstract** – The centipede genus *Tuoba* is reexamined in the Australasian region and four species are found to occur: *Tuoba sydneyensis*, *T. laticeps* *T. xylophaga* and a new species *T. pallida* from Western Australia.

### INTRODUCTION

The taxonomy of the geophilomorph centipedes found in the littoral zone in Australia has a long and sometimes confusing history. Pocock (1891) described *Geophilus sydneyensis* from Port Jackson and *G. (?) laticeps* from King Island, (the (?) presumably noting that he had strong doubts about the genus) and then he transferred both species to *Necrophloeophagus* only ten years later (Pocock 1901). Specimens from Western Australia referable to both *Necrophloeophagus sydneyensis* and *N. laticeps* were then described by Attems (1911) as *G. hartmeyer*. The latter was placed in *Nesogeophilus* Verhoeff 1924 by Attems (1929), who applied the genus name to a group of coastal centipedes with a virtually world-wide distribution. Often all the species were listed in a work with no attempt to work out the proper synonyms. Crabill (1962) synonymised *Nesogeophilus hartmeyer* and *Necrophloeophagus laticeps* as *Nesogeophilus laticeps*, but said nothing about *Necrophloeophagus sydneyensis*.

*Geophilus xylophagus*, described from New Zealand by Attems (1903), was redescribed by Archey (1936), who unfortunately based his concept of the species on a mixture of *G. xylophagus* and two species now placed in *Tasmanophilus* Chamberlin 1920. Crabill (1968) showed that *Nesogeophilus* Verhoeff is a junior subjective synonym of *Tuoba* Chamberlin, a genus erected for *Tuoba curticeps* from the Solomon Islands, originally referred to the Gonibregmatidae (Chamberlin 1920). Crabill (1968) also synonymised *G. xylophagus* incorrectly with *Tuoba laticeps*. In letters written to the Tasmanian Museum and R. Mesibov in the 1970's, the late Dr Crabill showed an interest in Tasmanian specimens of *Tuoba* but was unwilling to name the local forms.

In his work on the myriapods of New Caledonia, Brölemann (1931) described a species found there

as *Algerophilus leptochilus*. He also suggested that *Geophilus xylophagus* and *G. hartmeyer* should be included in the same group. A further species mentioned by Brölemann (1931) is *G. dupontii* (Silvestri, 1897). I have seen this species and it is a completely different genus and not a *Tuoba*. Demange (1963) showed that *A. leptochilus* should really be called *Nesogeophilus leptochilus* and later (1981) stated that it also occurred around the Seychelles.

In searching through the literature in the quest for *Tuoba* and in 'disentangling' *Tuoba* from *Tasmanophilus* for a revision of the latter genus, I have examined types and unidentified material from Australia, Tasmania, New Zealand, New Caledonia, New Britain and the Solomon Islands. Here I redescribe *Tuoba sydneyensis*, *T. laticeps* and *T. xylophaga*, describe *T. pallida* sp. nov. from Western Australia and establish new synonymies for *Nesogeophilus leptochilus* and *Tuoba curticeps*. The morphological terms used are mainly those adopted by Eason (1964) and by Crabill (1968).

The following abbreviations are used:

- AMNZ Auckland Institute and Museum, Auckland, New Zealand
- BMNH British Museum Natural History, London, Great Britain
- MCZ Museum of Comparative Zoology, Harvard, U.S.A.
- NMW Naturhistorisches Museum, Wien, Austria
- QVM Queen Victoria Museum and Art Gallery, Tasmania, Australia
- TM Tasmanian Museum, Hobart, Tasmania, Australia
- WAM Western Australian Museum, Perth, Western Australia, Australia
- ZIMH Zoologisches Institut und Museum, Hamburg, Germany

## SYSTEMATICS

## Family Geophilidae

Genus *Tuoba* Chamberlin

*Tuoba* Chamberlin, 1920: 35.

*Nesogeophilus* Verhoeff, 1924: 413. Synonymised by Attems, 1929:184.

*Algerophilus* Brölemann, 1925: 250. Synonymised by Brölemann, 1925: 250.

## Type species

*Tuoba*: *Tuoba curticeps* Chamberlin, 1920 (from Solomon Islands).

*Geophilus* (*Nesogeophilus*): *Geophilus* (*Nesogeophilus*) *bäckströmi* Verhoeff, 1924 (from Juan Fernandez).

*Algerophilus*: *Geophilus hispanica* Meinert, 1870 (from Spain, Seville, Granada).

## Diagnosis

Clypeus bounded by broad paraclypeal sutures, labrum tripartite. Prosternum with chitin lines. Carpophagus structures occupy the segments to the transition (Eason, 1964). Coxopleural glands are complex, with each coxopleuron having a single large, concealed glandular crypt that is multiglandular and multicanaliculate. The pretarsal anterior parunguis is spiniform, greatly elongate and much longer than the minute posterior parunguis (Figures 3, 15, 29, 40). Anal claw present. Littoral.

*Tuoba sydneyensis* (Pocock)

Figures 1–11

*Geophilus sydneyensis* Pocock, 1891: 219; Attems 1914: 133; Attems, 1929: 326.

*Necrophloeophagus sydneyensis* (Pocock): Pocock, 1901: 461.

*Geophilus* (*Aporophilus*) *sydneyensis* (Pocock): Attems, 1903: 262.

*Geophilus hartmeyeri* Attems, 1911: 158. figs 11, 12 (in part); Attems, 1914:127 (in part) Attems 1914: 133; Chamberlin, 1920: 53 (in part) (synonymised by Crabill, 1968: 345).

*Tuoba curticeps* Chamberlin, 1920: 35; Attems, 1929: 338. New synonymy.

*Geophilus* (?) *sydneyensis* Pocock: Chamberlin, 1920: 54.

*Nesogeophilus hartmeyeri* (Attems): Attems, 1929: 186 (in part); Attems, 1947: 118 (in part).

*Algerophilus leptochilus* Brölemann, 1931: 311. New synonymy.

*Algerophilus hartmeyeri* Brölemann, 1931: 314, by implication.

*Nesogeophilus leptochilus* (Brölemann): Attems, 1947: 118; Demange 1963: 87.

## Material Examined

*Syntype* of *Geophilus sydneyensis* Pocock

1 ♂, Inner Double Bay, Port Jackson, New South Wales, Australia (BMNH, accession no. BM 1879.5.20.13).

*Types* of *Geophilus hartmeyeri* Attems

Lectotype, Denham, Shark Bay, Western Australia, Australia (designated by R. Crabill, 12 May 1960) (ZIMH).

1 paratype (A), same data (designated by R. Crabill, 12 May 1960) (ZIMH).

1 syntype, Denham, Shark Bay, Western Australia, Australia (NMW, 2006).

*Paratype* of *Tuoba curticeps* Chamberlin

1 ♀ Wainoni Bay, Solomon Islands, W.M. Mann (MCZ TC-138(2167) and slide 2167a). The holotype of *Tuoba curticeps* has been lost.

*Types* of *Algerophilus leptochilus* (Brölemann)

The types of this species could not be found in the Muséum National d'Histoire Naturelle, Paris. However I was able to examine samples of *Nesogeophilus leptochilus* which Demange used for his 1963 paper.

## Other Material

Australia: Western Australia: 13 ♂, 8 ♀, Eagle Bluff, 26°06'S, 113°35'E, 25–29 November 1991, seagrass litter from littoral zone, M.S. Harvey and M.E. Blosfelds (WAM 92/1050–71); 3 ♂, 2 ♀, Eagle Bluff, 26°06'S, 113°35'E, 25–29 November 1991, under rocks, littoral zone, M.S. Harvey and M.E. Blosfelds (WAM 92/1072–6); 2 ♀, Mandu Mandu Beach, Cape Range National Park, 29 February 1986, on beach, under crab exuviae, J.M. Waldock (WAM 92/1112–3); 2 ♂, 1 ♀, Rosemary Island, 6 August 1985, R.P. McMillan (WAM 92/1386–8).

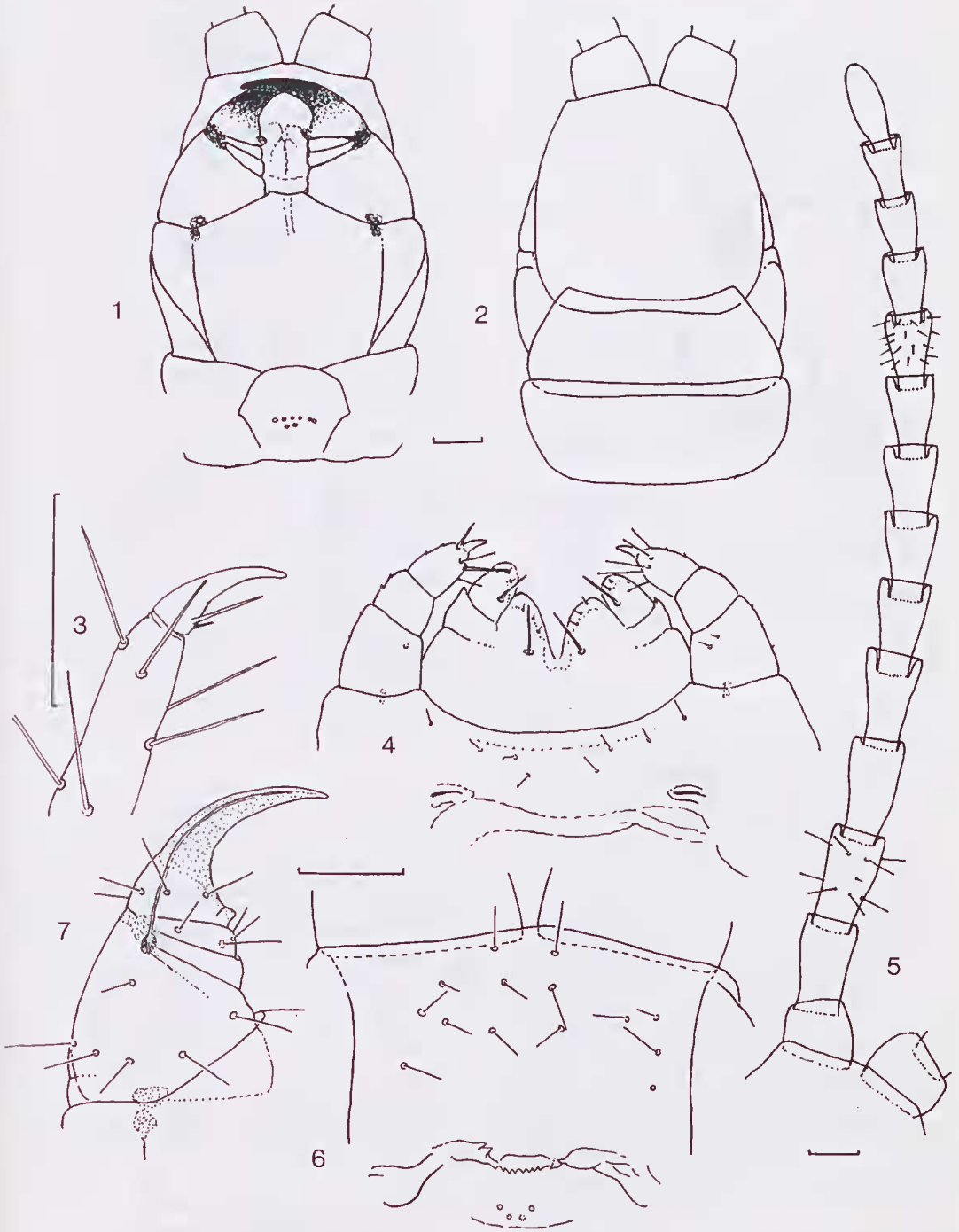
Papua New Guinea: New Britain: 5 ♂, 2 ♀, Hoskins, 23 May 1997, on sandy beach under small logs, R.E. Jones (R.E. Jones collection).

## Description

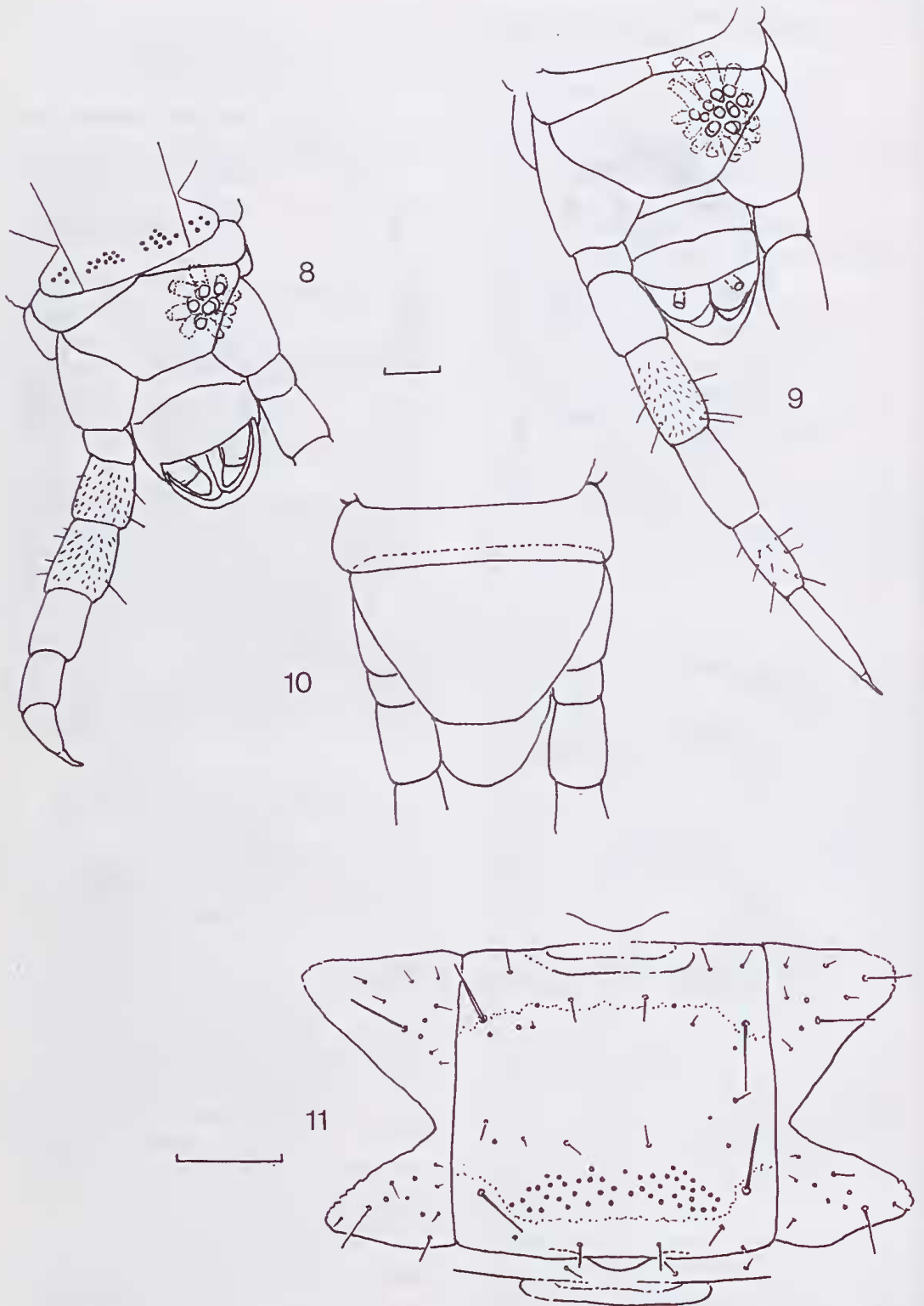
Maximum length 32 mm.

Number of leg-bearing segments 39–55 (43–49 ♂, 43–55 ♀ in Australia, 39–41 ♂, 41–43 ♀ in New Caledonia, 45 ♂, 45–47 ♀ in New Britain and 47 ♂, 49 ♀ in the Solomon Islands). The numbers of legs for males and females in this and the following species will no doubt be extended as more are collected.

Colour orange yellow throughout. Antennae: about 5 times the length of the head capsule, first segment as broad as long then from the second to the penultimate about twice as long as broad, last segment greatly exceeded by the previous two (Figure 5). Setae moderate throughout. Head



Figures 1-7 *Tuoba sydneyensis* (Pocock): 1, head from below; 2, head from above; 3, claw of left walking leg; 4, first and second maxilla from below; 5, antenna from below; 6, clypeus; 7, forcipule from below. Scale lines = 0.1 mm.



Figures 8–11 *Tuoba sydneyensis* (Pocock): 8, last segment from below, ♂; 9, last segment from below, ♀; 10, last segment from above; 11, sternite of segment 8. Scale lines = 0.1 mm.

capsule as long as broad, the sides being convex (Figure 2). Clypeus 1+1 postantennary setae and 6+6 midlabral setae, there is a slight area of reduced areolation on either side in front of the labrum. Labrum tripartite, 7–9 teeth on the midpiece and 2+2 on the sidepieces (Figure 6). First maxilla 3+3 setae on the teleopodites and 4+4 setae on the coxal projections, (in both cases there is 1 large seta and the rest are very small), there is a small lappet on the teleopodite. Second maxilla bears a simple claw surrounded by a whorl of six or seven setae (Figure 4). Forcipules (prehensors / poison claws) with concavity of claw smooth and a small basal node, reaching almost to the front of the head capsule when closed. Chitin lines complete or nearly so (Figures 1, 7). Sternites: pores throughout forming a ventral band on the sternite which becomes two separate groups by the end of the animal, also on the procoxa and metacoxa plus a few scattered across the front of the anterior segments. Areolation less than in *T. laticeps* forming a band at the dorsal and later the ventral areas of the sternite. Carpophagus structure present until the transition, the fossa being over half as wide as the sternite at its full extent (Figure 11). Metatergite trapeziform, wider than long (4:3), sides slightly convex (Figure 10), metasternite trapeziform, the sides being slightly concave. Coxopleuron contains about 20–35 glands in a rosette arranged around a pit. Last legs of female two times the length of the penultimate legs, femur 2:1 length to breadth (Figure 9), last legs of male fatter, femur about 1.5 : 1 length to breadth (Figure 8). Anal pores present. Claws present on last legs.

#### Remarks

Brölemann's excellent drawings and the specimens of Demange that I have seen show that it is clearly a species of *Tuoba*. *Nesogeophilus leptochilus* has a lower number of leg pairs than the *Tuoba sydneyensis* of Australia (39–43 pairs) but I can find no other differences between them and am inclined to amalgamate them as one species, *T. sydneyensis*. Likewise *T. curticeps*, of which the type is lost but a paratype remains, shows the characters associated with *T. sydneyensis* and I have also amalgamated them as *T. sydneyensis*. The specimens collected from New Britain also appear to be *T. sydneyensis* with 45–47 pairs of legs. The only difference being the pretarsal anterior parunguis which is as long as the claw in one specimen and may represent the unworn state.

#### *Tuoba laticeps* (Pocock)

Figures 12–23

*Geophilus* (?) *laticeps* Pocock, 1891: 220, pl. 12, fig. 6, 6a; Chamberlin, 1920: 54.

*Necrophloeophagus laticeps* (Pocock): Pocock, 1901: 463.

*Geophilus* (*Aporophilus*) *laticeps* (Pocock): Attems, 1903: 261.

*Geophilus hartmeyeri* Attems, 1911: 158. figs 11, 12 (in part); Attems, 1914: 127 (in part); Attems 1914: 130; Chamberlin, 1920: 53 (in part) (synonymised by Crabill, 1968: 345).

*Geophilus laticeps* Pocock: Attems 1914: 130; Attems, 1929: 328.

*Nesogeophilus hartmeyeri* (Attems): Attems, 1929: 186 (in part). (Attems): Attems, 1947: 118 (in part).

*Algerophilus hartmeyeri* Brölemann: 1931 by implication.

*Nesogeophilus laticeps* (Pocock): Crabill, 1962: 506; Mesibov, 1986: 54.

*Tuoba laticeps* (Pocock): Crabill 1968: 345.

[*Tuoba xylophagus*: Crabill, 1968, not (Attems) 1903 (incorrect synonymy by Crabill, 1968: 345).]

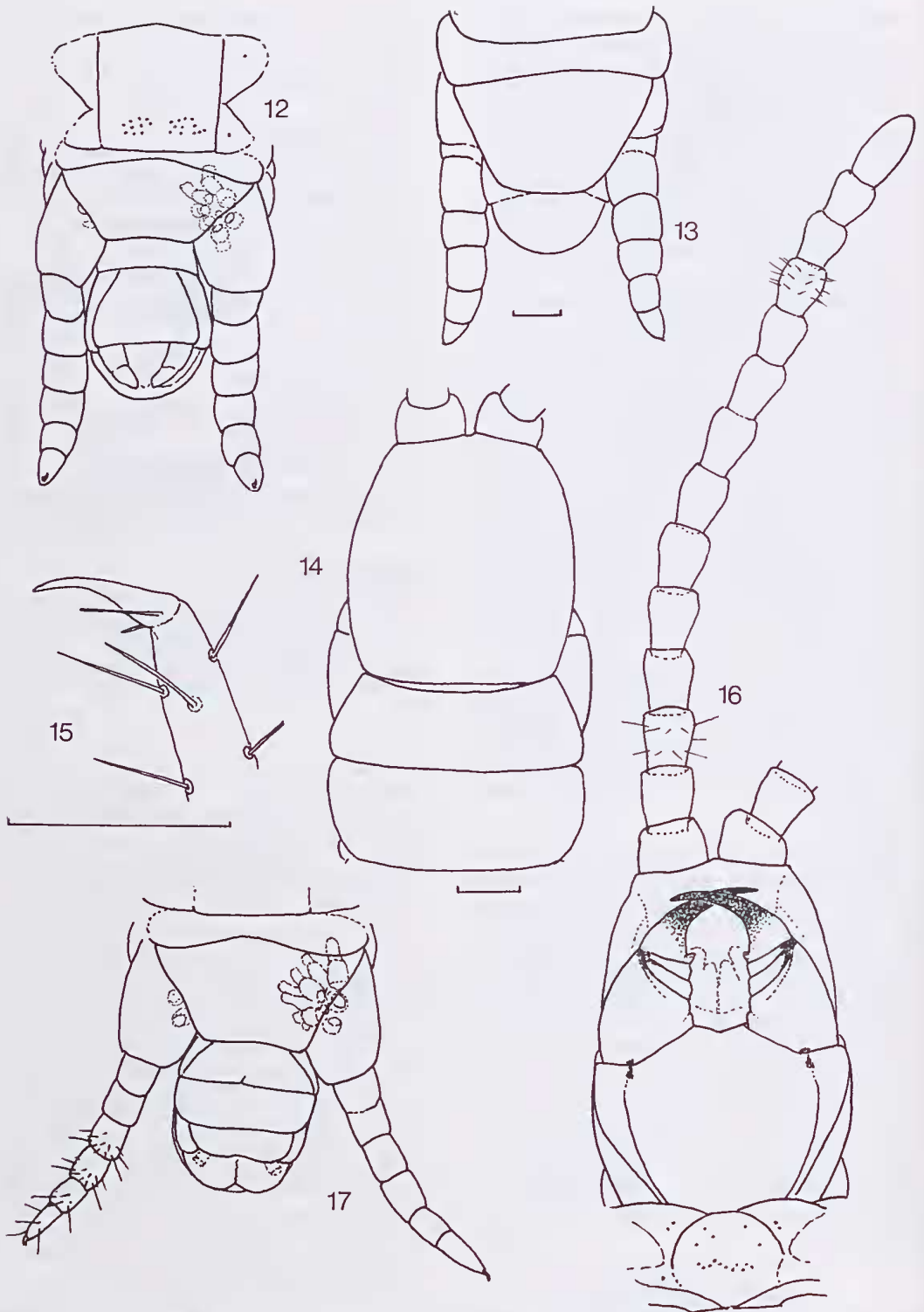
#### Material Examined

*Holotype* of *Geophilus laticeps* Pocock  
♀, King Island, Bass Strait, Australia, A. Dendy (BMNH, accession no. BM 1888.144).

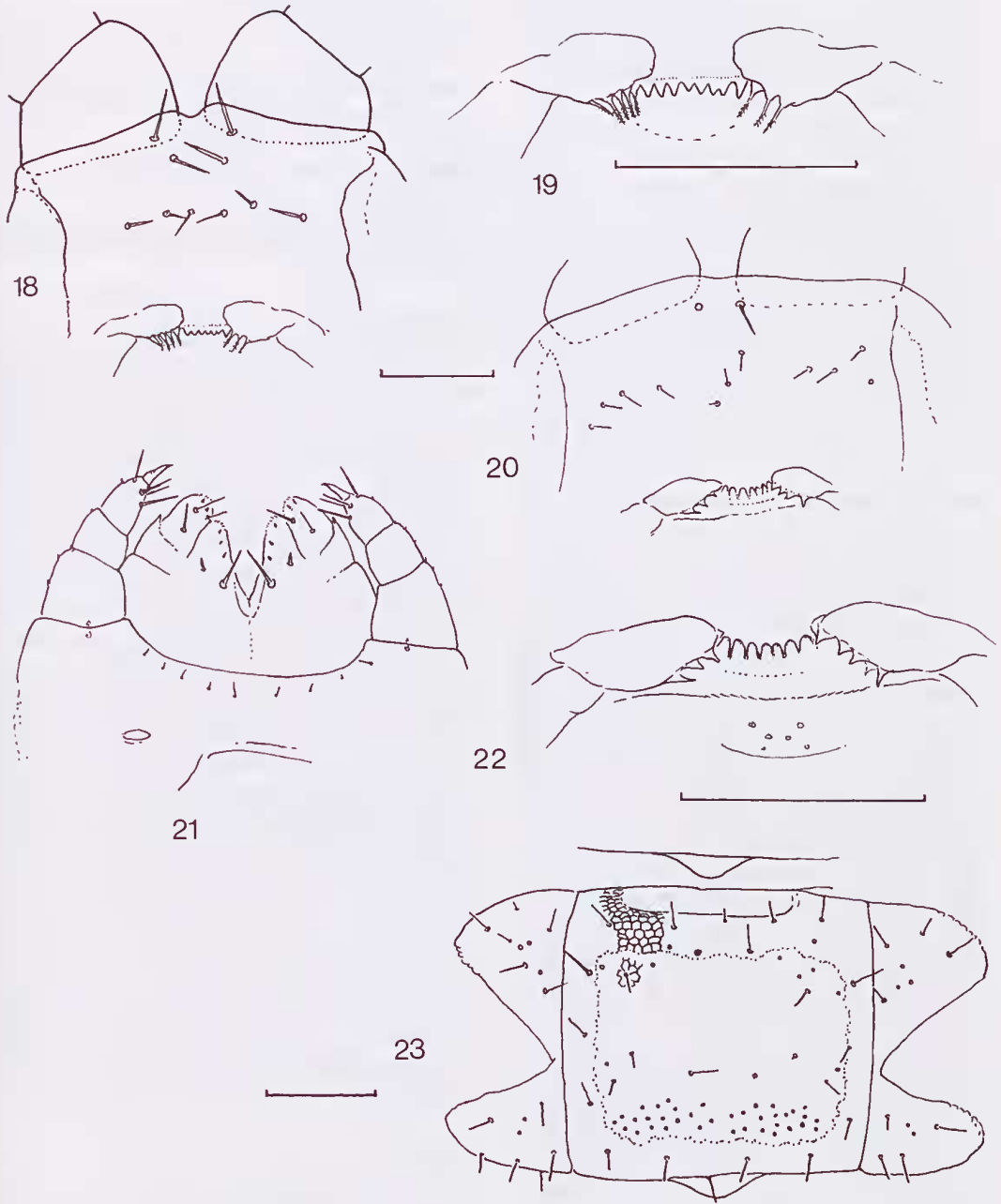
*Syntype* of *Geophilus hartmeyeri* Attems  
1, Albany, Western Australia, Australia (NMW, 2007).

#### Other Material

**Australia: Tasmania:** 1 ♀, Midway Point, S.E. Tas., 4 April 1973, under rocks at high tide level on shore, Mr G. Prestedge [det. *Tuoba* sp. Dr R.E. Crabtree (sic), 1984] [TM J3139/2, slide prepared by R.E. Crabill (labelled 74.II.7/GC-6)]; 1 ♂, 10 ♀, Midway Point, S.E. Tas., 4 November 1973, under rocks on sand, at high water mark, under a causeway (= the second causeway), Mr G. Prestedge [det. *Tuoba* sp. Dr R.E. Crabtree (sic), 1984] (TM J3140); 2 ♂, 1 ♀, Brick Maker's Beach, Municipality of Circular Head, 21 January 1995, under stones on fine shell gravel, rocky shore, upper barnacle zone and black obtuse "*Littorina*", S.J. Lewis (QVM 23:17732); 6 ♂, 5 ♀, E. end of Bay just West of Penguin, 30 January 1995, under stones, strand line by rocky outcrop S.J. Lewis (QVM 23:17730); 6 ♂, 5 ♀, N. end of Ralphs Bay, Lauderdale, Hobart, 25 January 1995, under stones, strandline, stony beach, S.J. and J.G.E. Lewis (QVM 23:17733); 1 ♂, N. corner Prosser Br. Bay, Orford, 26 January 1995, in small cave 1 × 1 ♂, under rock + woodlice, crabs, sand hoppers, J.G.E. Lewis (QVM 23:17735); 2 ♂, 2 ♀, 2 ♂, 2 ♀, Swansea, S. most part Nine Mile Beach by small rocky prom., 27 January 1995, under stones, drift zone with woodlice, sandhoppers, S.J. Lewis (QVM 23:17736).



Figures 12-17 *Tuoba laticeps* (Pocock): 12, last segment from below, ♂; 13, last segment from above, ♂; 14, head from above; 15, claw of right walking leg; 16, head and antenna from below; 17, last segment from below, ♀. Scale lines = 0.1 mm.



Figures 18–23 *Tuoba laticeps* (Pocock): 18 and 20, clypeal regions; 19 and 22, labra; 21, first and second maxilla from below; 23, sternite of segment 9. Scale lines = 0.1 mm.

### Description

Maximum length 23 mm.

Number of leg-bearing segments 43–59 (43–59 ♂, 45–59 ♀).

Colour orange yellow throughout. Antennae about 3 times the length of the head capsule, the first segment broader than long, the second longer than broad (1.5 : 1) segments gradually becoming shorter until length and breadth are about equal. Last segment about as long as the two preceding. Setae moderate throughout (Figure 16). Head capsule as long as broad, the sides convex (Figure 14). Basal plate present. Clypeus with two postantennal setae and two to three intermediate setae with a row of six to eleven setae below them (Figures 18, 20). Labrum tripartite, seven or eight tubular teeth on the mid-piece and up to five long thin filaments (fimbriae) arising from broad bases and having the tips divided into smaller filaments. (This feature is not always visible and may be absent, only triangular teeth being seen in some slide preparations) (Figures 19, 22). First maxilla with membranous tips to the telopodite and coxal projections, small lappet on the telopodite, setae 3+2 on the telopodites (plus 2+2 micro-setae) and 2+2 (plus 3+3 micro-setae) on the coxal projections. Second maxillae bear a ring of 4+4 setae at the tip and 9 setae on the syncoxite. Claw of second maxilla appears to be simple with a curved tip but it may represent a fusion of elements. Syncoxite entire (Figure 21). Forcipules with concavity smooth and a small basal node, reaching just short of the head. Chitin lines complete or nearly so (Figure 16). Sternites, segments with very pronounced areolation until the transition. After segment four or five there is a central smooth rectangle which also contains a ventral band of pores until about segment 14 when it divides into two. Pores also on the procoxa and metacoxa plus a few scattered across the front of the anterior part of the segments. The carpophagus structure is present up until the transition, (about segment 11). At its maximum the carpophagus fossae are about two thirds of the breadth of the sternite (Figure 23). Last segment, metasternite practically semicircular (Figure 13), metasternite trapeziform, the sides being slightly concave. The presternite is divided. Coxopleuron contains a group of about seven to nine coxal glands opening into a pit. Last legs of the female only slightly fatter and longer than the penultimate legs (Figure 17) and the last legs of the male again slightly fatter still (Figure 12). Anal pores present. Claws present on last legs.

*Tuoba xylophaga* (Attems)  
Figures 24–34

*Geophilus xylophagus* Attems, 1903: 273; Attems

1914: 127; Chamberlin, 1920: 53; Archey, 1936: 50, p 12, fig. 7.

*Nesogeophilus xylophagus* (Attems): Attems, 1929: 185; Attems, 1929: 118.

*Algerophilus xylophagus* Brölemann, 1931: 314, by implication.

*Tuoba xylophagus* (Attems): Crabill, 1968: 345 (as a synonym of *Tuoba laticeps*).

### Material Examined

#### Holotype

New Zealand, 1903 (NMW, 318, 2 slides in poor condition).

#### Other Material

New Zealand: 1 ♂, Muriwai, Waitemata Co., North Island, 7 October 1931, G. Archey (AMNZ 812, plus slide No. 2); 1 m. Muriwai, Waitemata Co., North Island, 7 October 1931, G.A. (AMNZ 813, plus slide No. 3); 1 ♀, Whangaeri, October 1932, Chas. E. Clarke (AMNZ 846, AMNZ 811 Slide No 1); 5 ♂, 1 ♀, Muriwai, Waitemata Co., North Island, 7 October 1931 G. Archey (AMNZ 847); 1 ♂, Waikewau Beach, N. E. Coromandel, 15 November 1932 G. Archey (AMNZ 848); 1 ♂, 1 ♀, Brighton Beach, on dead bird (AMNZ 850, no. 101); 1 ♂, 1 ♀, Helena Bay, Whangarei, Whangarei Co. North Island 8 January 1935, on seaweed washed ashore, E.D. Pritchard (AMNZ 852); 1 ♂, Christchurch, South Island, 1902, Sumner (AMNZ 853); 1 ♀, Ahipara, Manganui Co. North Island, 25 February 1925, G.A. (AMNZ 854); 1 ♀, Oakura Taranaki Co. North Island, 10 June 1931, G. Archey (AMNZ 855, det. *Otageophilus xylophagus* Attems; as far as I can find out *Otageophilus* was never used in any publication); 5 ♂, 2 ♀, Punakaiki, 21 September 1974, supralittoral sand (P.M. Johns collection, Canterbury University); 5 ♂, 3 ♀, Carters Beach, Westport, 27 February 1978, logs on sand (P.M. Johns collection, Canterbury University); 2 ♂, 1 ♀ Brue Bay, Sth Westland, 19 January 1979, supralitt. (P.M. Johns collection, Canterbury University); 6 ♂, 2 ♀, 2 km N. of Karkoura, 27 August 1984, fine stony beach, driftwood, (P.M. Johns collection, Canterbury University); 1 ♂, locality unknown (AMNZ 851).

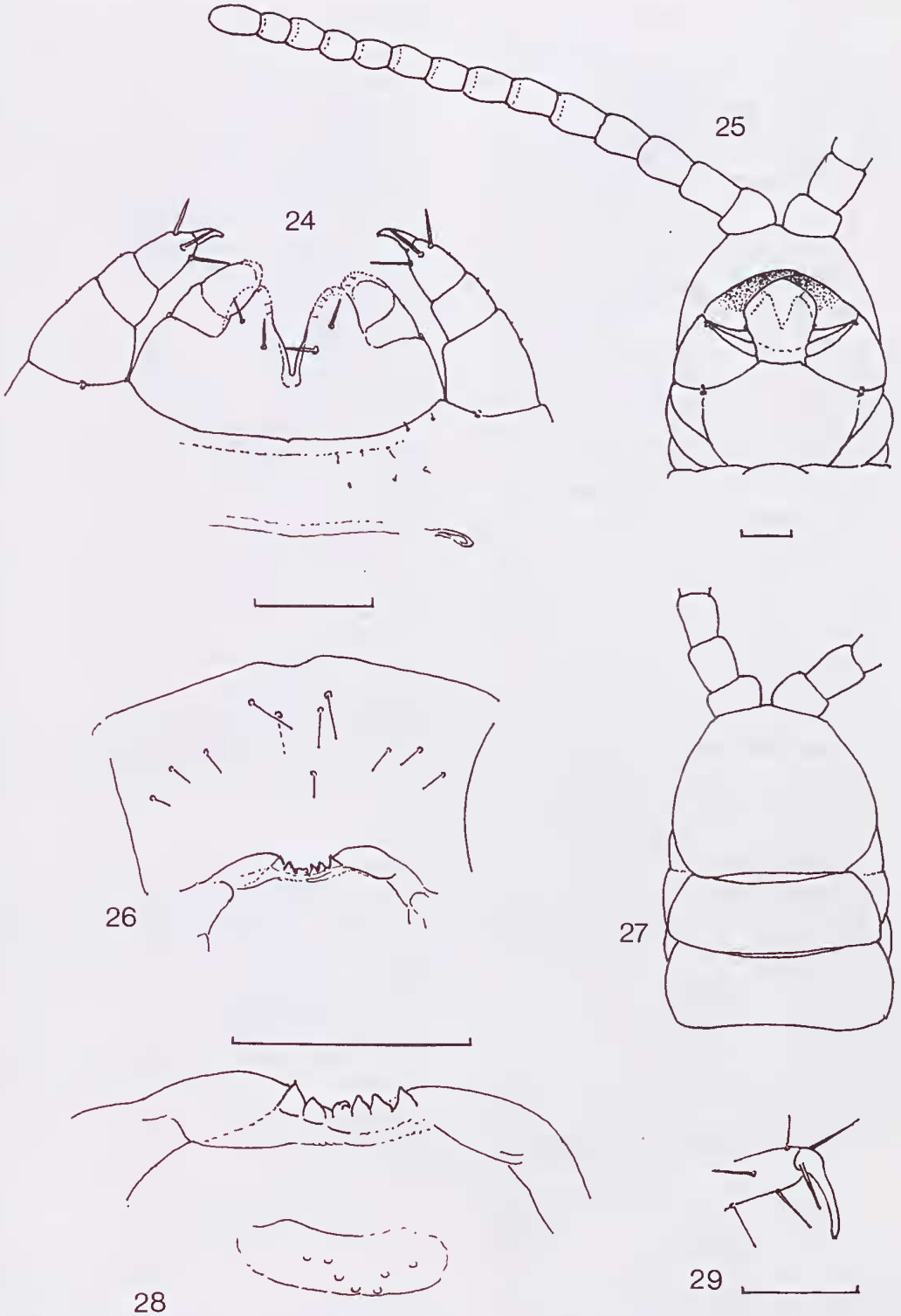
### Description

Maximum length 45 mm.

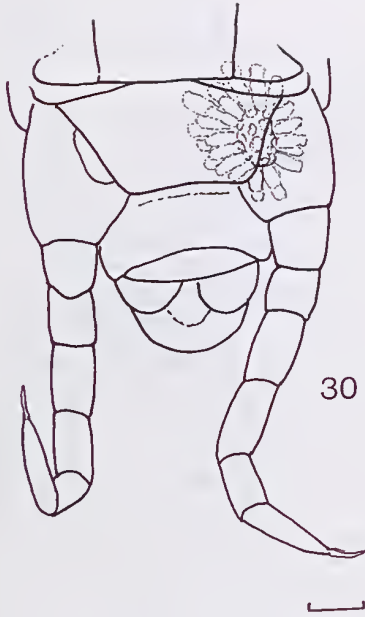
Number of leg-bearing segments 57–67 (57–65 ♀, 61–67 m).

Colour orange yellow throughout. Antennae about 4 times the length of the head capsule, first segment as long as broad thereafter longer than broad decreasing until the penultimate which is barely longer than broad. Last segment slightly

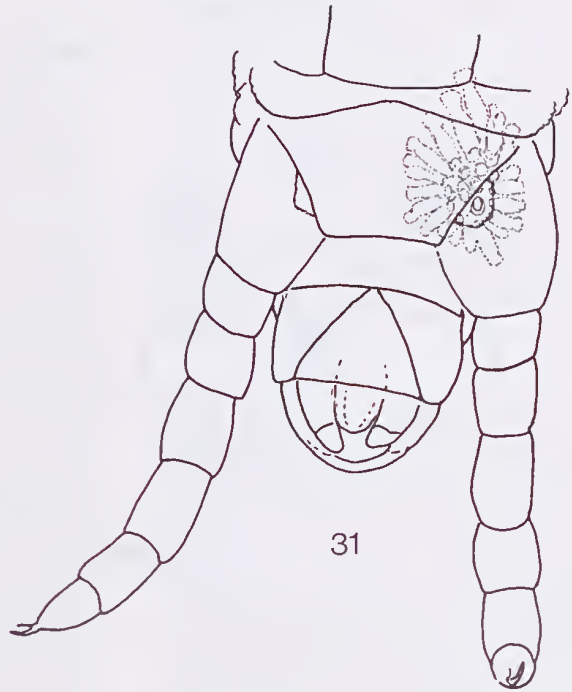




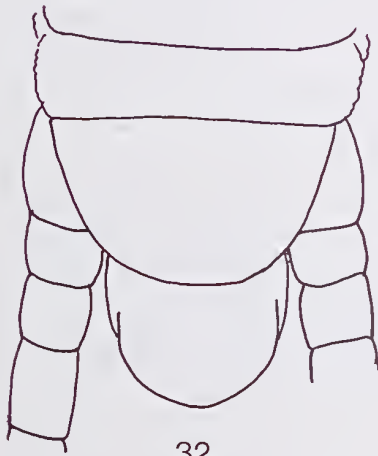
Figures 24-29 *Tuoba xylophaga* (Attems): 24, first and second maxilla from below; 25, head and antenna from below; 26, clypeus; 27, head from above; 28, labrum; 29, claw of left walking leg; Scale lines = 0.1 mm.



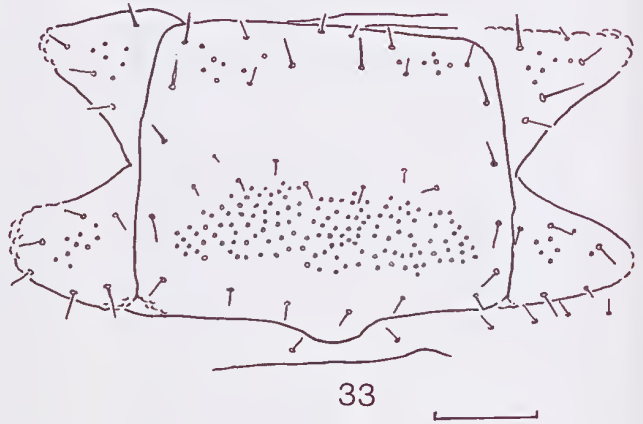
30



31



32



33



34

Figures 30-34 *Tuoba xylophaga* (Attems): 30, last segment from below, ♀; 31, last segment from below, ♂; 32, last segment from above, ♂; 33, sternite of segment 19, 34, labrum. Scale lines = 0.1 mm.

shorter than the last two. Setae moderate throughout (Figure 25). Head capsule as long as broad the sides being convex (Figure 27). Basal plate present. Clypeus with 2+2 postantennary setae, 3+3-4 medial setae and 1-2 prelabral seta (Figure 26). Labrum with 4-6 pointed teeth on the midpiece and 1-3 on the side pieces (Figures 28, 34). First maxilla with tips membranous and ciliate and 2-5+2-4 setae (plus micro-setae) on the central lobes and 0-2+0-3 setae (plus micro-setae) on the telopodites. Very rudimentary lappets on the telopodites. Secondary maxilla with a simple claw half the length of the last telomere which also bears 3 setae (Figure 24). Forcipules rounded with the concavity smooth and no basal node, reaching to just short of the head capsule when closed. Chitin lines complete or nearly so (Figure 25). Sternites with pores on all segments in a spindle shaped group in the hind part of each segment also on the procoxa and metacoxa plus a few scattered across the front of the anterior segments. Carphophagus structure from the second to about segment twenty, the fossae occupying just under half the width of a sternite at their largest (Figure 33). Metatergite D-shaped, wider than long, the convex sides converging posteriorly and the posterior edge being straight or nearly so (Figure 32). Metasternite is rhomboidal, wider than long, all edges being slightly concave. Coxal glands opening into a pit partially covered by the metasternite, there being about 30 per side. The last legs of the female not much longer than the walking legs (Figure 30), the last legs of the male slightly fatter than those of the female, but not much (Figure 31). Anal pores present. Claws present on last legs.

#### Remarks

Archev retained *xylophagus* in *Geophilus* (1936), in which he also described two species which are now regarded as *Tasmanophilus* (Jones, in preparation). He muddled specimens of this species with some *Tasmanophilus spenceri* and *Tasmanophilus* sp. which gave rise to the error that there were "oval median depressions present, deep on anterior segments, shallower on middle ones" in this genus. His paper also gave a diagrammatic representation of the last segment but the coxal pores were interpreted incorrectly.

The name *xylophagus* changes to *xylophaga* to conform to the gender of the genus.

#### *Tuoba pallida* sp. nov.

Figures 35-43

#### Material Examined

##### *Holotype*

♀, Rockingham, Penguin Island, Western Australia, Australia, 2 July 1980, Silver Gull nest

litter *Larus novaehollandiae*, S. and J. Peck, SBP WA 80 (WAM 92/1358).

#### *Paratypes*

Australia: Western Australia: 1 ♂ 3 ♀, same data as holotype (WAM 92/1359-61); 1 ♂, 1 ♀, Windy Harbour, 27 km S. of Northcliffe, 8 July 1980, coast shrub litter, S. and J. Peck, SBP WA 101 (WAM 92/1648-9).

#### Description

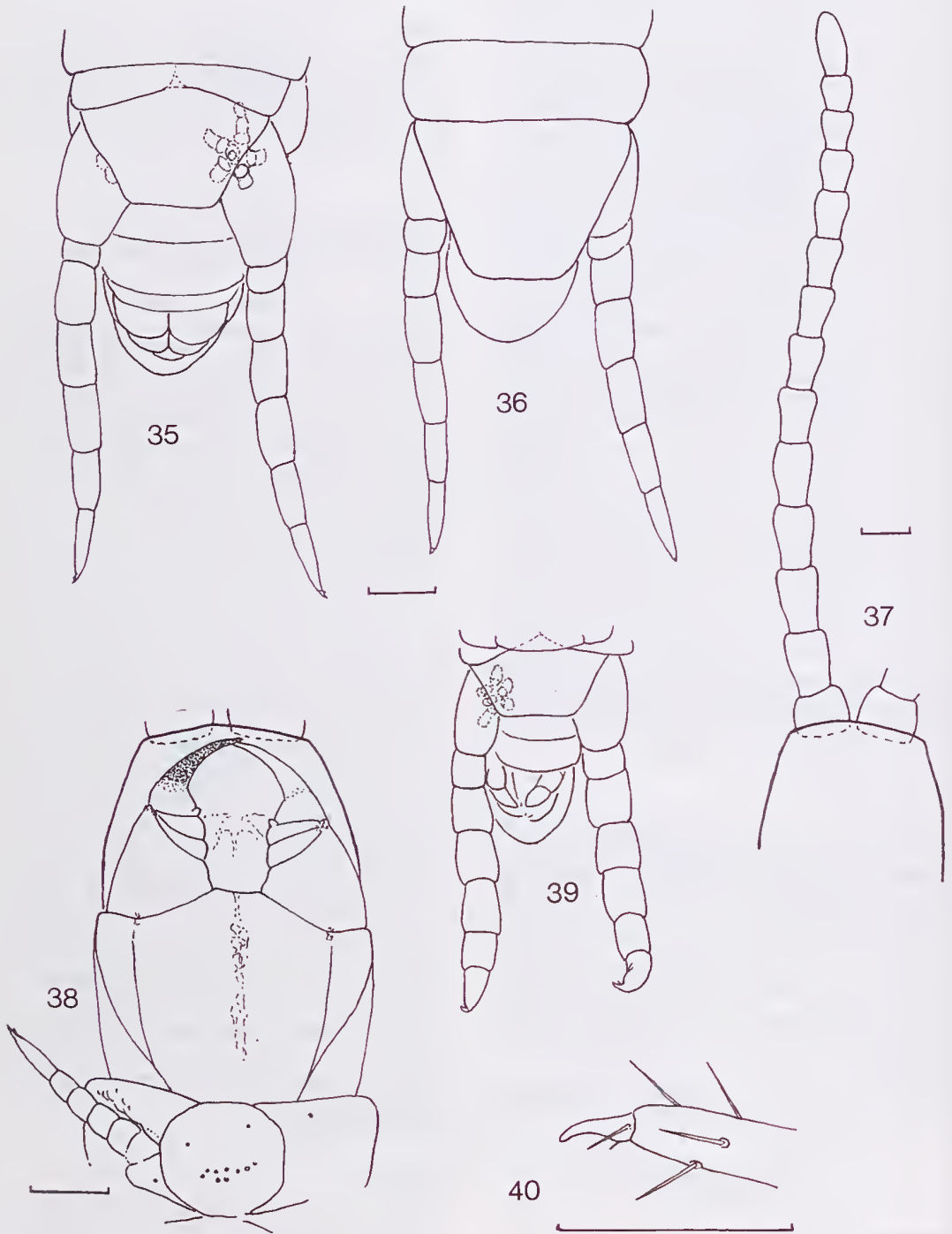
Maximum length 25 mm.

Number of leg-bearing segments 55-59 (55 ♂, 57-59 ♀).

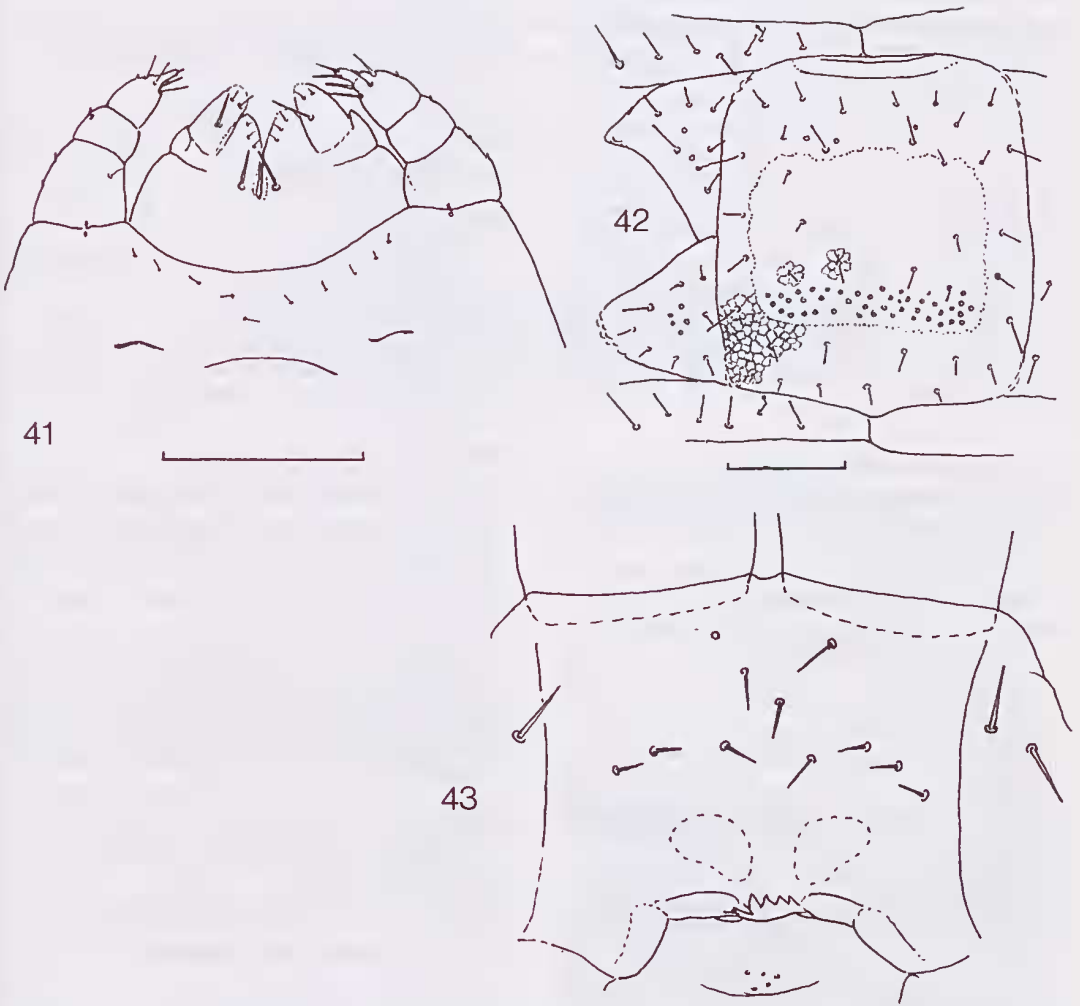
Colour white throughout. Head capsule slightly longer than wide, anteriorly narrowed, the sides convex. Antennae about 4 times the length of the head capsule. The first segment broader than long, the second longer than broad (1.5:1) decreasing slightly until the penultimate segment, the last segment being just shorter than the preceding two. Sparsely covered with setae throughout (Figure 37). Clypeus consists of 2+2 anterolateral setae and a band of 3+4 intermediate setae. There are two areas of reduced areolation just distal of the labrum. Labrum not very clear but it is tripartite, with at least four teeth on the centre piece (Figure 43). First maxillae with ciliate tips to the telopodites and coxal processes and a small lappet on each side, setae are 3+3 on the telopodites and 4+4 on the processes. Second maxillae with claws that appear to end in a bristle and surrounded by 4 or 5 setae (Figure 41). Forcipules reach to just short of the head capsule when closed, small basal nodes present. Chitin lines complete or nearly so (Figure 38). Carphophagus structure reduced and almost absent, very hard to see. Pores on every segment as a posterior band except for the first where they form a circular group. Also pores on the procoxa and metacoxa and a few scattered across the front of the segment (Figure 42). Metatergite rhomboidal, the sides and posterior edge nearly straight (Figure 36), metasternite trapeziform, the sides being slightly concave. Coxal glands opening into a pit partially covered by the metasternite, there being about 6-8 per side. Last legs of male slightly swollen, about as long as the walking legs (Figure 39), less swollen in the female (Figure 35, 36). Anal pores are apparently not present. Claws present on last legs.

#### Remarks

The four species of littoral centipedes which are known to occur in the region can easily be separated by leg numbers and the size of the last pair of legs. *Tuoba sydneyensis* has 39-55 pairs of legs and the last legs are comparatively long. *T. laticeps* has 43-59 pairs of legs but the last legs are



Figures 35–40 *Tuoba pallida* sp. nov.: 35, last segment from below, ♀; 36, last segment from above, ♀; 37, antenna; 38, head from below; 39, last segment from below, ♂; 40, claw of right walking leg; Scale lines = 0.1 mm.



Figures 41-43 *Tuoba pallida* sp. nov.: 41, first and second maxilla from below; 42, sternite of segment 9; 43, clypeus. Scale lines = 0.1 mm.

comparatively short and not much longer than the walking legs. The antennae differ in length being much longer in the former but in preserved specimens the antennae often shrink in length, the antennomeres being telescoped inside one another.

*T. xylophaga*, with 57-67 pairs of legs, is found only in New Zealand where it should not cause any problems. *T. pallida* has been found in Western Australia so far. It has 55-59 pairs of legs, comparatively long thin last legs coupled with its very pale, almost white, colouring make it easy to identify. However, at the present state of knowledge of Australian centipedes, it should be borne in mind that there may be similar species which have not yet been recorded.

#### REMARKS

About 20 species of the genus have now been described but it is still in a taxonomic muddle, there are probable synonyms amongst them and some have been wrongly attributed to *Tuoba*. In *Tuoba* a number of coxalpleural glands should open into a pit or crypt. There are several other species recorded from the Pacific basin all of which may or may not be valid. *Nesogeophilus amamiticus* from Indochina seems to be very similar to *T. sydneyensis* from the literature description and would repay a look.

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